West-wide Jumpstart Air Quality Modeling Study (WestJumpAQMS)

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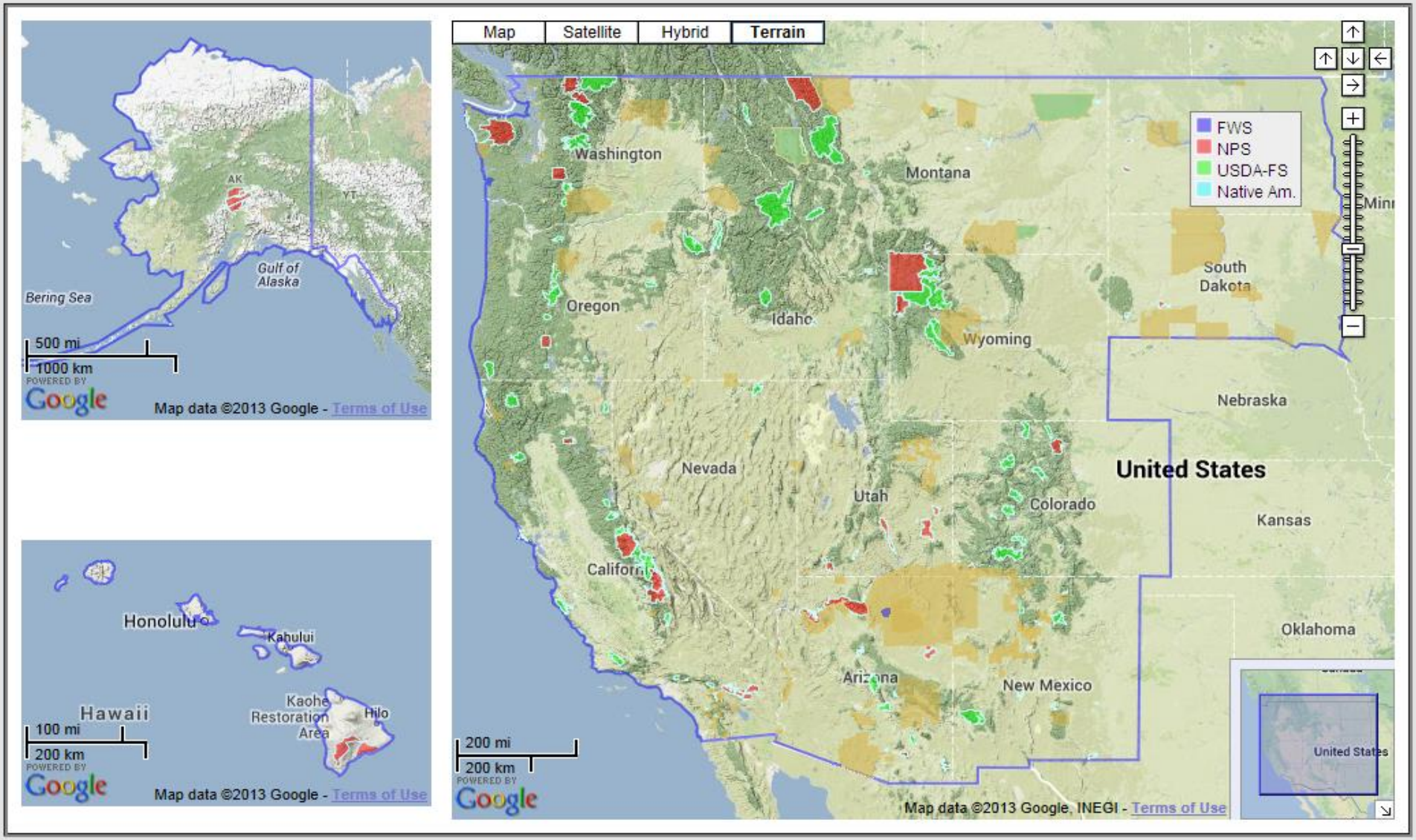
September 10, 2013

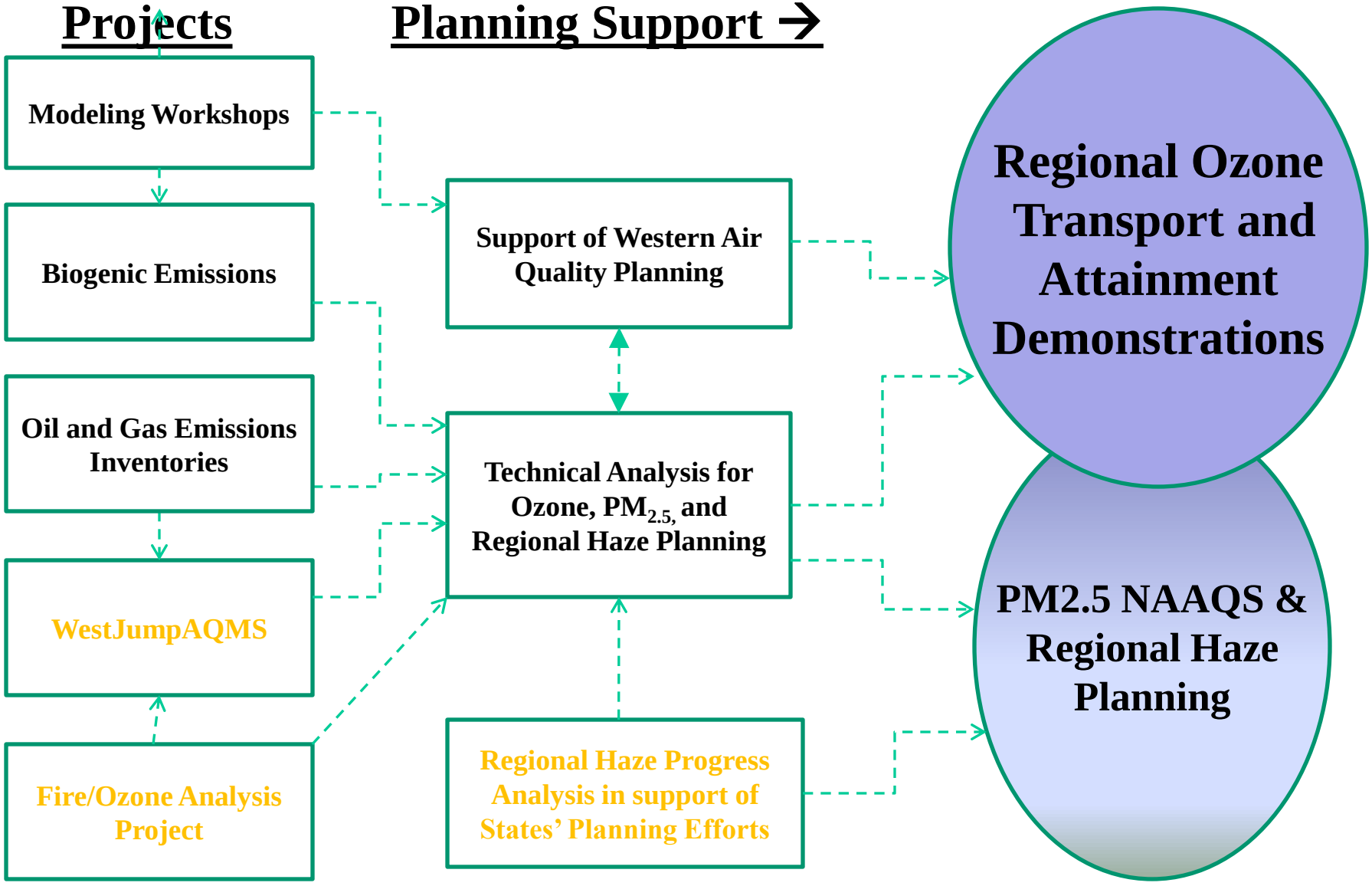
4 Corners Air Quality Group Update Meeting
Durango, CO

WRAP Region Areas and Points of Interest



- 15 states, federal land managers and EPA, tribes, and local air districts
- Regional analyses for Western sources and air quality impacts

WRAP Regional Work supporting Western Air Quality Planning

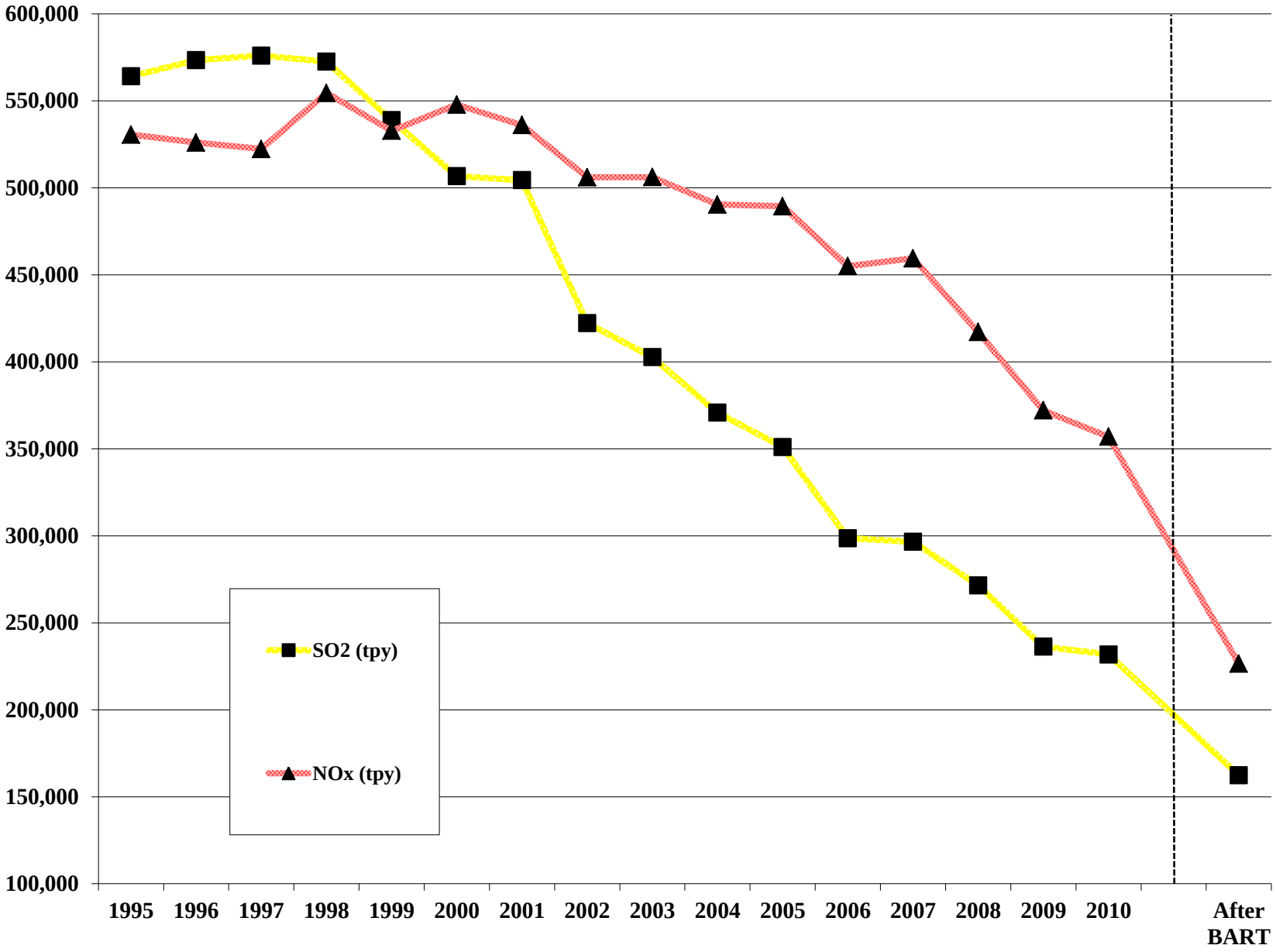


Western Ozone Precursor Emissions Sources

- Power plants decreasing markedly
- Mobile sources controlled through federal rules and state testing programs
- Fire effects receiving intensive study
  - Deterministic & Empirical Assessment of Smoke's Contribution to Ozone (DEASCO$_3$)
- Biogenics (natural plant sources)
- Oil and gas increasing and changing…

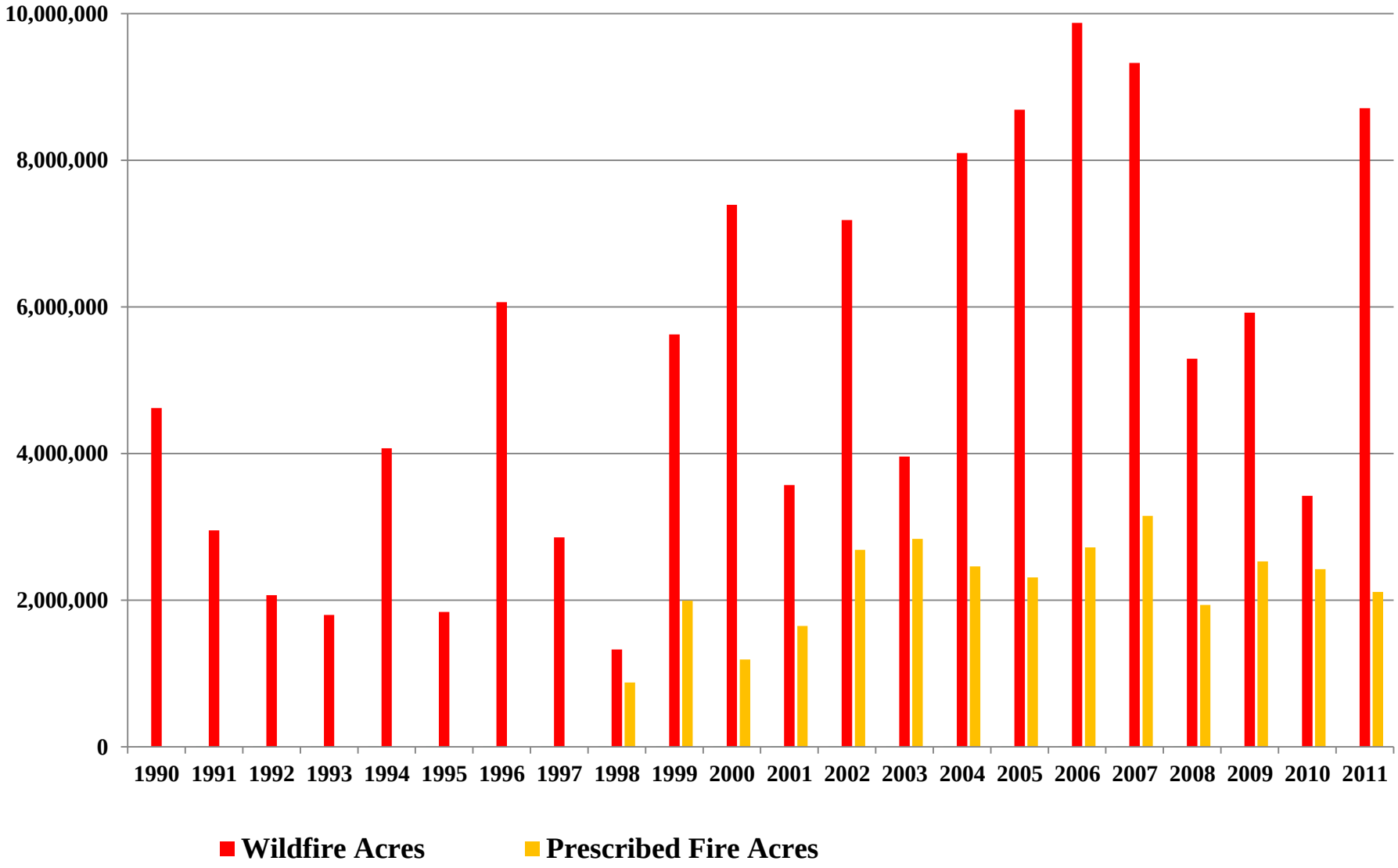
- All sources currently being studied in comprehensive regional modeling analysis – 2008 base year
  - West-wide Jumpstart Air Quality Modeling Study (WestJumpAQMS)

Western State Power Plant Emissions Trends



Historical data from EPA Clean Air Markets Division, Projections by WRAP staff

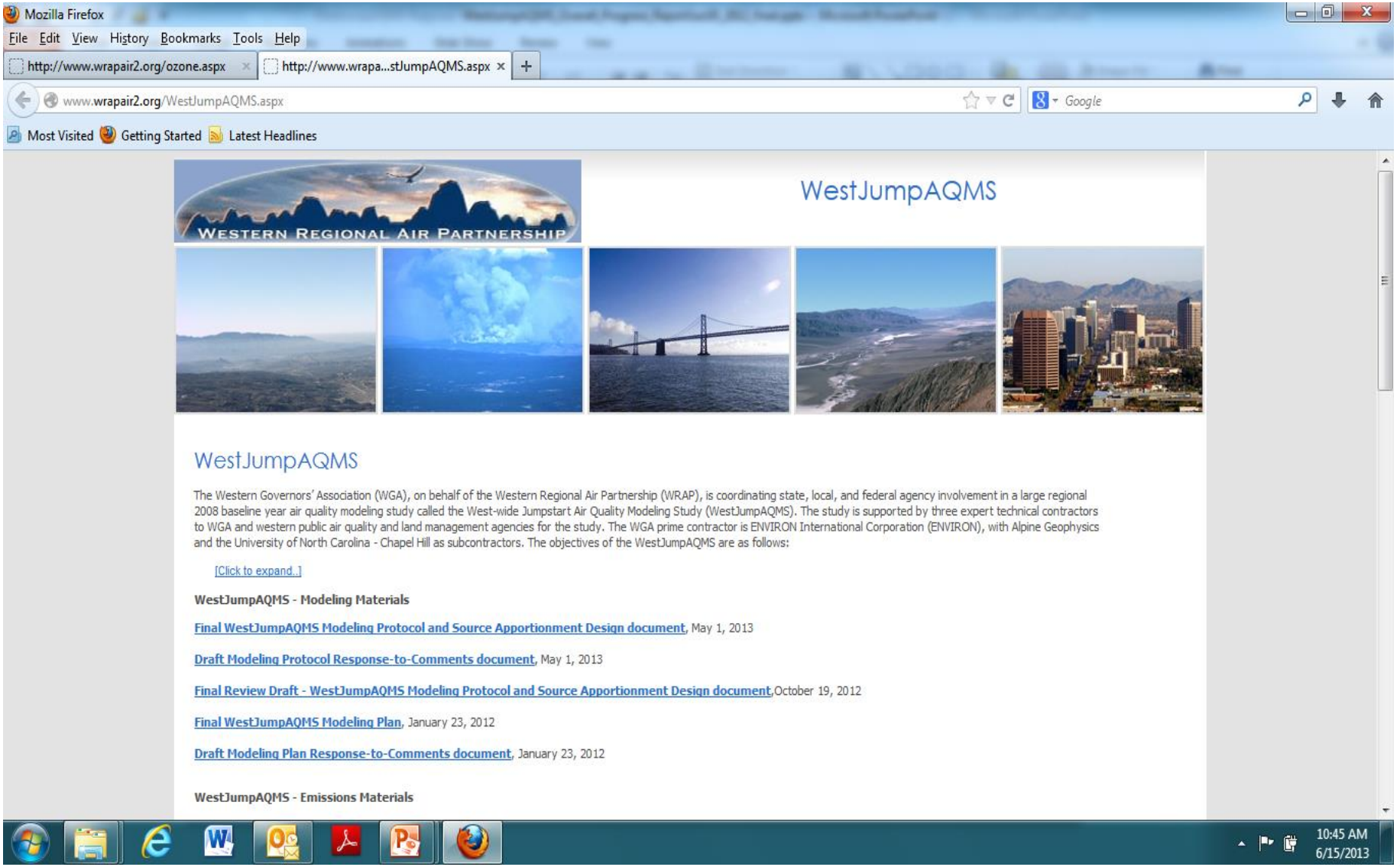
U.S. Wildfire and Prescribed Fires Acres Burned - 1990 through 2011



2012 right behind 2006 in wildfire acres burned

- Future Ozone standards could result in many areas in western U.S. being nonattainment
- WRAP has initiated West-wide Jumpstart Air Quality Modeling Study (WestJumpAQMS) to:
  - Initiate next generation of regional technical analysis for ozone planning in the western U.S.
  - Continue work conducted at the WRAP Regional Modeling Center (RMC) and leverage recent air modeling studies
  - Provide a preliminary assessment of the role of ozone transport to elevated ozone concentrations across the West

- Contracting team of ENVIRON, Alpine Geophysics and UNC IE
- WestJumpAQMS webpage with all products and documents



Final Report Outline

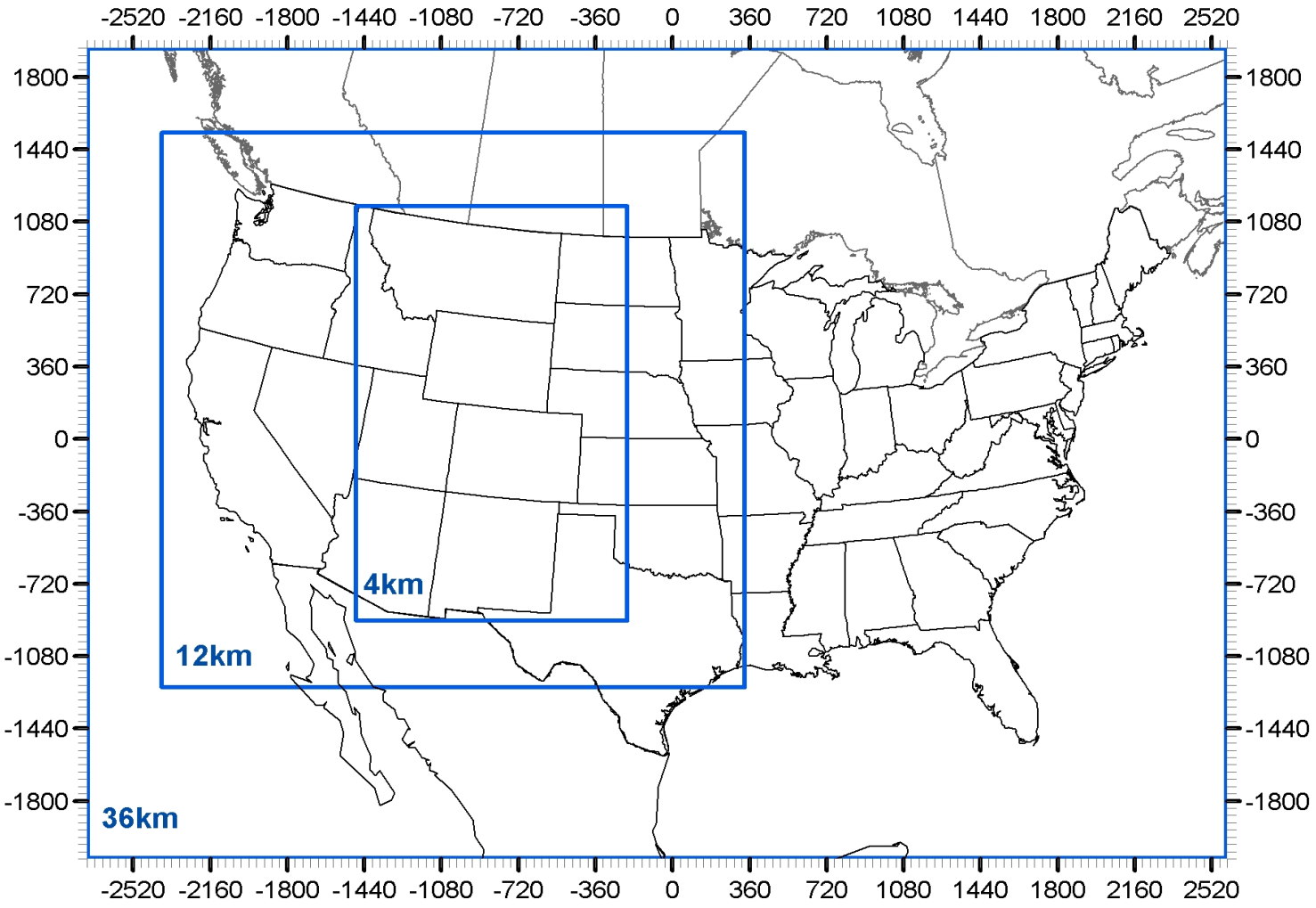
1. Introduction
2. Meteorological Modeling
3. 2008 Base Case Emissions
4. 2008 Base Case Modeling/Model Evaluation
5. 2008 State-Specific Ozone Source Apportionment
6. 2008 State-Specific PM Source Apportionment
    a. Includes visibility and nitrogen deposition impacts
7. 2008 Source Category-Specific Source Apportionment
8. Lessons Learned
9. References

- 15 Electronic Appendices

15 Electronic Appendices (A through O)

- Allows users to drill down into source apportionment analyzing data at individual monitors and for high days as well as look at effects of alternative levels for ozone standards
- Data in Excel spreadsheets with pivot tables that can be downloaded from WRAP website
  - Select monitoring sites, species, source categories and days to display results
- Map displays of modeling results in zipped files
- http://www.wrapair2.org/WestJumpAQMS.aspx

36 km CONUS; 12 km WESTUS; and 4 km IMWD processing domain

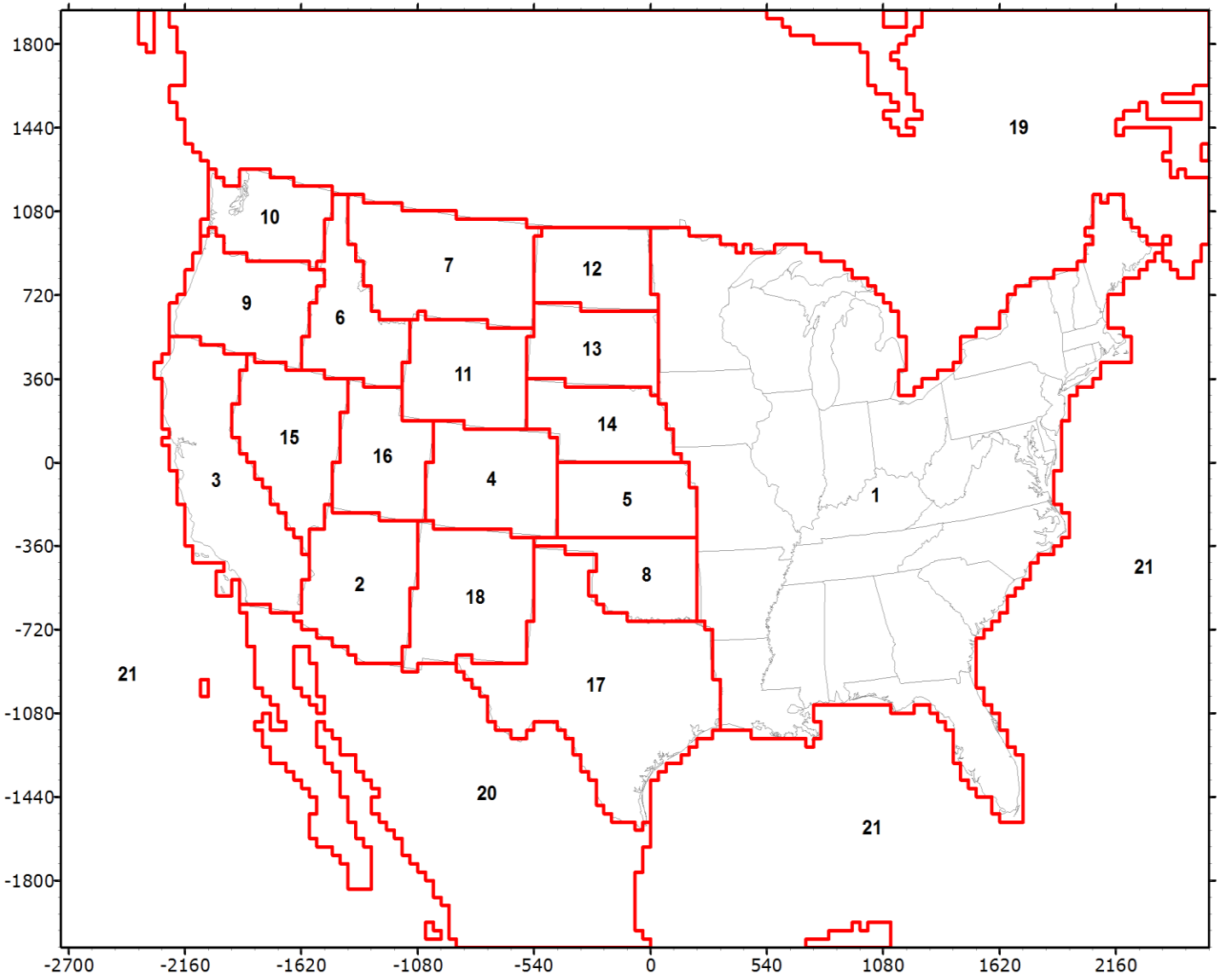


Modeling Domain

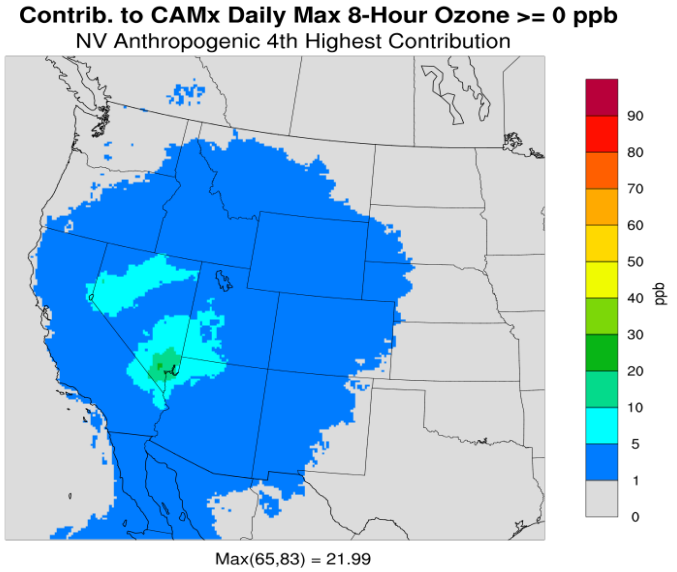
State-Specific Source Apportionment Modeling

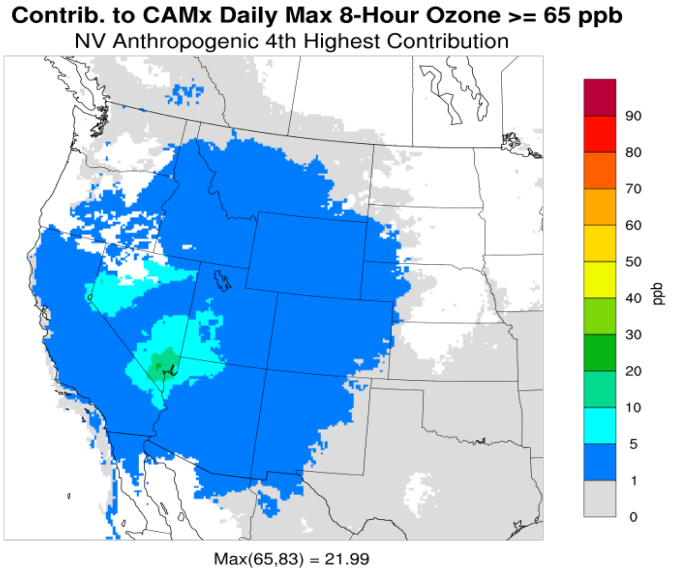
- 2008 Base Case scenario (actual emissions)
- Source Regions (21): 17 Western States, Eastern USA, Canada, Mexico, and Offshore
- Source Categories (5): Natural (Biogenic, Lightning, Sea Salt and Windblown Dust), Fire (separately for wild, prescribed, agricultural) and Anthropogenic (industry, vehicles, et cetera)
- Source Groups (107): 21 x 5 + 2 (for initial and global boundary conditions)
  - Solves for anthropogenic contributions to ozone source apportionment
  - Examine upwind state anthropogenic (Anthro+Rx+Ag) contribution to downwind state ozone/$PM_{2.5}$ Design Values
  - Results are presented as maps and tables of state contributions to high ozone and $PM_{2.5}$
  - Ozone contribution to daily max ozone $\geq$ 76, 70, 65, 60 and 0 ppb
  - $PM_{2.5}$ contribution to 24-Hour $PM_{2.5} \geq$ 35, 30, 25, 20 and 0 $\mu g/m^3$

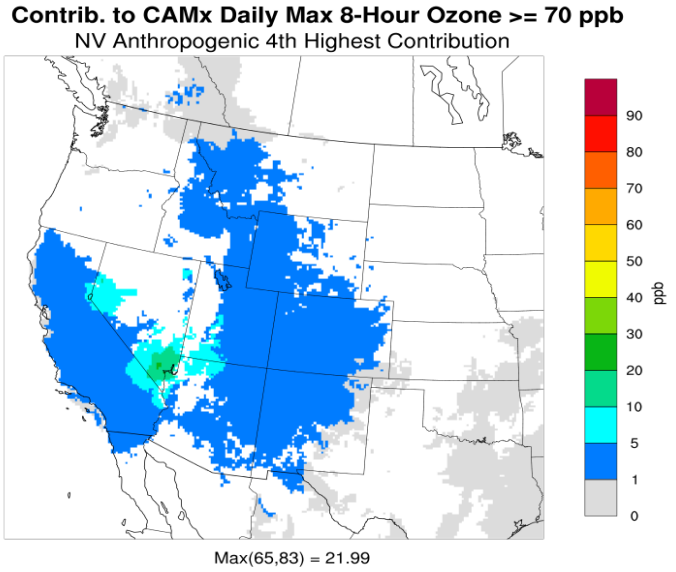
State-Specific Source Apportionment
21 Source Regions

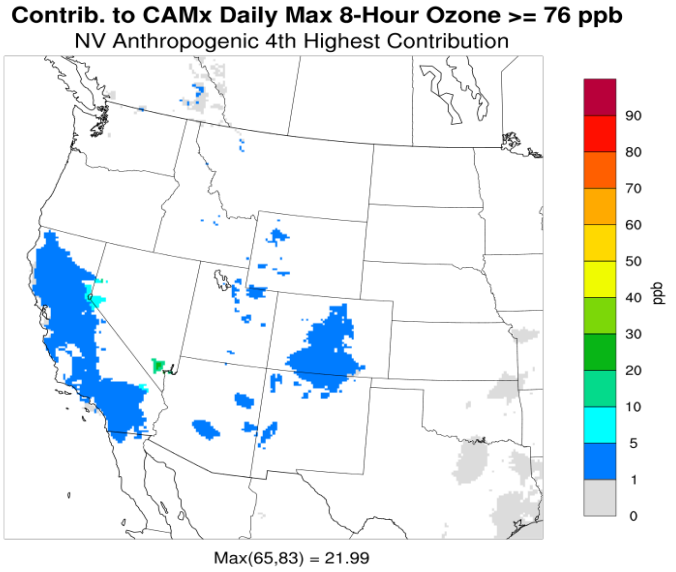


Example: Nevada anthropogenic sources' contribution to Ozone compliance value at different standard levels



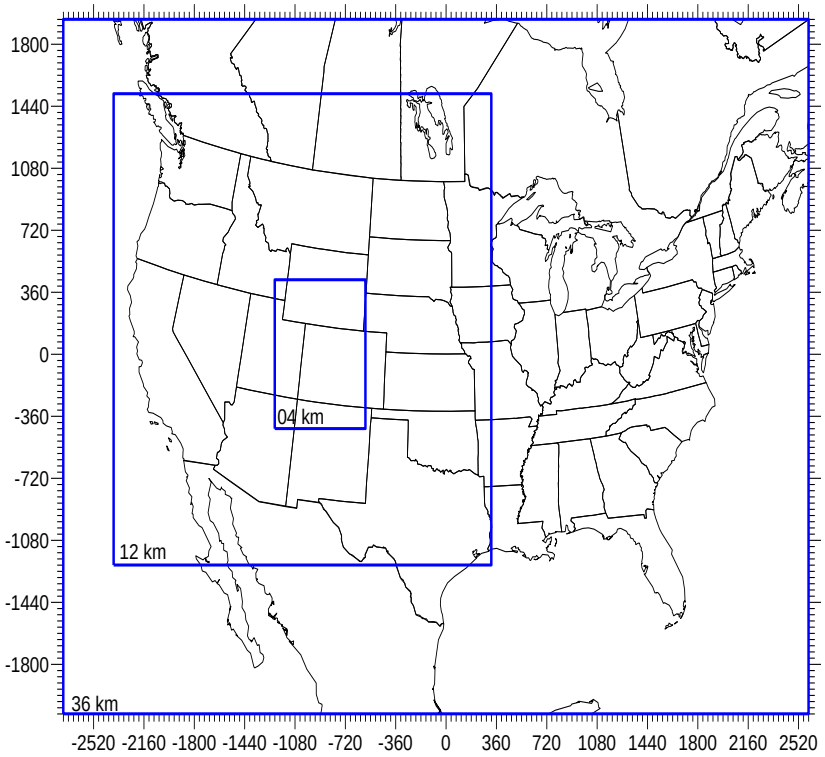






Source Category-Specific Source Apportionment

- Separate Ozone and PM Contributions due to 6 Major Source Categories in USA:
  - Natural
  - Fires
  - Oil and Gas
  - Points
  - Mobile (On-Road, Non-Road, Commercial Marine)
  - Area
- PM Source Apportionment
  - 2008 Annual
  - 36/12 km
  - One Source Region
- Ozone Source Apportionment
  - May-Aug 2008
  - 36/12/4 km
  - Separately for NM, UT, CO & WY



Deterministic and Empirical Assessment of Smoke's Contribution to Ozone (DEASCO$_3$) Project

Sponsored by the Joint Fire Sciences Program

Purpose and Goals

Assess fire's impact on elevated ozone episodes with retrospective studies in the West, Central, and Southeastern U.S., using empirical and photochemical modeling analyses

- **Support future collaborative FLM-state ozone air quality planning**
- **Develop "lessons learned" as basic analysis rules for fire-ozone episodes, and on-line tools for FLM-state air quality planning**
- **Prepare and implement planning-grade fire emissions inventories in the Fire Emissions Tracking System (FETS) suitable for SIP work by states / FLMs**
- **Publish data & analysis results in transparent & reproducible formats**
- **Leverages WestJumpAQMS modeling platform for fire analysis**
- **http://deasco3.wraptools.org/**

DEASCO$_3$ Hypotheses

Technical

- Ho1 – Smoke from fire contributes to background concentrations of O3 in large areas of the U.S.
- Ho2 – Fire/Smoke Management can affect formation of O3.
- Ho3 – Fire(s) cause/contribute to O3 exceedances.

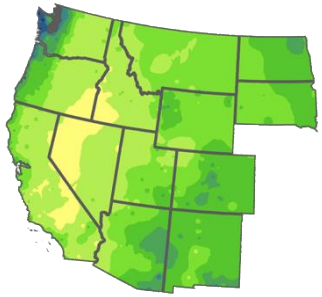
Policy

- Ho4 – Better quantitative information will help FLM's to assess the use of smoke management techniques to address non-attainment issues.
- Ho5 – The Rank Order(s) in the Online Tool will help FLM's to be more effective in the air quality planning processes.

Activity Data

Loading

Moisture

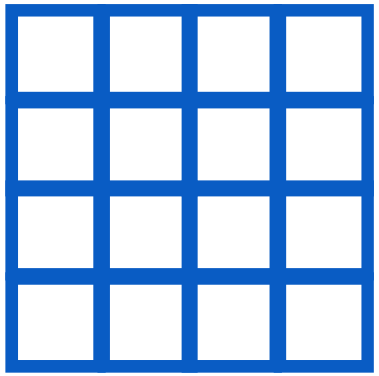


Emissions Model

FETS

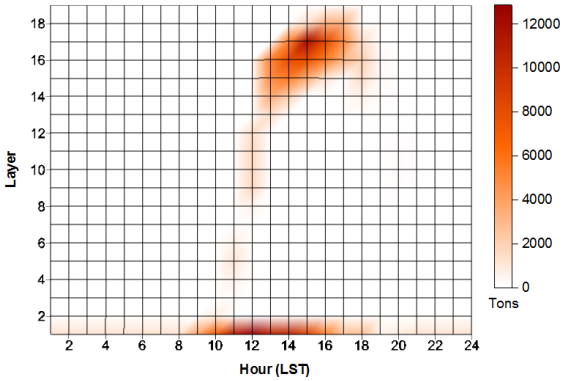
DEASCO$_3$

distribute emissions



Chemical Profiles

Loft emissions



WRAP Regional Haze Rule Reasonable Progress Report

- RHR requires progress checks every 5 years
  - Several western states have progress checks due, which could include SIP revisions, by end of 2013
  - Progress reports will help states prepare for full RHR plans due to be completed in 2018

- WRAP Reasonable Progress Report
  - Addresses 118 Class I areas in 15 western states
  - Involves extensive consultations with state representatives
  - Designed with regional, state and CIA specific summaries to provide the technical basis for states to draft their progress reports
  - http://www.wrapair2.org/reghaze.aspx

Regional Haze Rule Requirements for Progress Reports

- RHR requirements addressed in WRAP progress report:
  - What are current visibility conditions for the most impaired and least impaired days?
  - What is the difference between current visibility conditions and baseline conditions for the most impaired and least impaired days?
  - What is the change in emissions between the baseline period and the progress period?
    - Uses WestJumpAQMS emissions data
- RHR requirements to be addressed by States:
  - What is status of implementation of control measures in each State plan?
  - Are current implementation plan elements and strategies sufficient to meet reasonable progress goals?

Thanks -